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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/543,612	04/05/2000	Brian T. Cunningham	DR-308J	6510

7590 07/29/2003

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EXAMINER
CHAPMAN JR, JOHN E

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 07/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No. 09/543,612	Applicant(s) CUNNINGHAM ET AL.	
	Examiner John E Chapman	Art Unit 2856	

-- The MAILING DATE of this communication appears on the cover she t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *12-14,20 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,15-19 and 22-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 May 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification fails to support the claimed range of values.

3. Claims 1-3, 5, 7-8, 15, 17-18 and 22-23 are rejected under 35 U.S.C. 102(b) as being anticipated by White et al. (5,218,988).

White et al. discloses a sensor for measuring the mass of a substance on a membrane (col. 11, line 61-68).

Regarding claim 2, White et al. discloses a plate wave resonator in Fig. 11a having a membrane layer 111 whose resonant frequency is determined by the properties of the surrounding environment, including the mass of a loading fluid.

Regarding claims 8, 18 and 22, White et al. teaches use in an evaporation system (col. 11, line 68 to col. 12, line 4), which would appear to involve depositing a volume of volatile solution on the membrane and allowing the solution to evaporate.

4. Claims 4-6 and 23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over White et al. ('988).

Regarding claim 4, White et al. teaches providing a plurality of transducers 109 (col. 15, line 9). The transducers appear to be piezoelectric and, if not, it would have been obvious to provide transducers comprising a piezoelectric layer 46 in Fig. 4.

Regarding claim 5, feedback amplifier 25 in Fig. 1 comprises an oscillator device for driving membrane 22 at a resonant frequency, a frequency counter 27 comprises a frequency detection device.

Regarding claim 6, White et al. provides a gel 100 in Fig. 12 and fluid 115 in Fig. 17. It would appear necessary that the walls peripheral to membrane 22 form a cavity in order to confine the gel and/or fluid to the membrane, and, if not, it would have been obvious to form a cavity in order to confine the gel and/or fluid.

Regarding claim 23, the apparatus of White et al. appears to inherently be capable of measuring a change of mass of a substance within the subnanogram range, and, if not, merely to increase the range of sensitivity of the device would have been obvious.

5. Claim 11, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over White et al. ('988).

Regarding claim 11, it is well known in the art, and would have been obvious, to provide a means to display the mass of the substance. Note col. 11, lines 27-29.

Regarding claims 24 and 25, White et al. discloses a oscillator device 25 in Fig. 1 connected to a first transducer 23, and a frequency detection device 27 also connected to the first transducer 23. Accordingly, the only difference between the claimed invention and the prior art consists in connecting the frequency detection device 27 to the second transducer 24 instead of the first transducer 23. White et al. teaches preferably connecting the frequency counter at the output of amplifier 25 where the signal is greatest (col. 11, lines 24-27). Nevertheless, it would have been obvious (though less desirable) to connect the frequency counter 27 to the input of amplifier 25, and thereby to the second transducer 24, in order to detect the frequency of the Lamb wave.

6. Claims 8-10, 18-19, 22 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over White et al. as applied to claims 1 and 17 above, and further in view of Bowers.

The only difference between the claimed invention and the prior art consists in using the apparatus of White et al. to determine the concentration of a non-volatile residue. Bowers teaches providing a known volume of liquid 55 in Fig. 7 on SAW resonator 52 in order to measure the level of non-volatile residue in the liquid. It would have been obvious in view of Bowers to provide a known volume of a liquid on the sensor of White et al. in order to measure the level of non-volatile residue in the liquid.

Regarding claim 22, Bowers teaches depositing a volatile solution on the resonator. Note col. 12, lines 18-28.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over White et al. as applied to claim 1 above, and further in view of Ballato.

The only difference between the claimed invention and the prior art consists in providing an array of sensors. Ballato teaches providing an array of sensors in order to sense the presence of a plurality of chemical agents. It would have been obvious in view of Ballato to provide an apparatus comprising an array of sensors of White et al. in order to sense the presence of a plurality of chemical agents.

8. Claims 1, 7-8, 15, 17-18 and 22-23 are rejected under 35 U.S.C. 102(e) and (b) as being anticipated by Takeuchi et al. (Regarding 35 U.S.C. 102(b), note the PCT Pub. Date.)

Takeuchi discloses a sensor for measuring the mass of a substance on a diaphragm 56 in Fig. 1. A "diaphragm" is generally synonymous with a "membrane."

Regarding claim 7, note Fig. 26.

Regarding claim 8, note col. 10, lines 36-47.

Regarding claim 23, note col. 1, lines 5-13.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al.

It is well known in the art, and would have been obvious, to provide a means to display the mass of the substance.

10. Claims 8-10, 18-19, 22, 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Bowers.

The only difference between the claimed invention and the prior art consists in using the apparatus of Takeuchi et al. to determine the concentration of a non-volatile residue. Bowers teaches providing a known volume of liquid 55 in Fig. 7 on SAW resonator 52 in order to measure the level of non-volatile residue in the liquid. It would have been obvious in view of Bowers to provide a known volume of a liquid on the sensor of Takeuchi et al. in order to measure the level of non-volatile residue in the liquid.

Regarding claim 22, Bowers teaches depositing a volatile solution on the resonator. Note col. 12, lines 18-28.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. in view of Ballato.

The only difference between the claimed invention and the prior art consists in providing an array of sensors. Ballato teaches providing an array of sensors in order to sense the presence of a plurality of chemical agents. It would have been obvious in view of Ballato to provide an apparatus comprising an array of sensors of Takeuchi et al. in order to sense the presence of a plurality of chemical agents.

12. Applicant's arguments filed May 16, 2003, have been fully considered but they are not persuasive. Applicant argues that support for the range recited in claim 23 can be found in the

specification, which teaches measuring a change in mass of 200 picogram/mm^2. However, the disclosure of a single value does not provide adequate support for a specific range of values, in particular, the range of values from 100 to 100,000 picogram/mm^2.

Applicant argues that White et al. does not teach driving a membrane at a reference resonant frequency. However, White et al. clearly discloses an apparatus wherein a membrane 111 in Fig. 11a is driven at a resonant frequency. Note col. 14, line 62, to col. 15, line 16. The "reference" resonant frequency is the resonant frequency preceding the addition of a mass on the membrane. Note col. 11, lines 61-69, wherein White et al. teaches using the sensor as a scale for weighing very small masses. Applicant's argument that "Lamb-waves are in stark difference to standing waves" is without merit. In the embodiment of Fig. 11a, plate waves bouncing back and forth between two or more reflectors form a resonant cavity, i.e., form standing waves. See col. 15, lines 6-8.

Applicant argues that White et al. teaches away from applicant's invention because "White et al. clearly teaches, suggests, and discloses the use of Lamb-waves and makes a departure from the use of standing waves, i.e., SAW or Rayleigh waves." However, the use of Lamb waves or plate waves does not preclude the establishment of standing waves, as indicated above. Similarly, the mere use of SAW waves or Rayleigh waves does not preclude the establishment of standing waves. Whether standing waves are formed using Lamb, SAW or Rayleigh waves, depends upon the reflection properties (or boundary conditions) of the membrane supporting the waves. Furthermore, applicant's own invention does <u>not</u> support the existence of standing waves in the membrane 14. Rather applicant discloses waves which are transmitted from transducer 16 and

received by transducer 18, i.e., traveling waves. See page 10, line 22, to page 11, line 1. There is no disclosed mechanism for establishing standing waves in the membrane 14.

Applicant argues that Takeuschi et al. does not disclose a sensor having a membrane layer for receiving a substance thereon, an oscillator device configured to drive the membrane at a reference frequency, and a frequency detection device to determine the change in resonant frequency caused by the presence of the substance on the membrane. However, Takeuschi et al. discloses a sensor having a diaphragm 56 for catching a mass, wherein the resonant frequency of the mass sensor varies depending upon the mass of the diaphragm. Note col. 10, lines 22-35.

Applicant argues that in applicant's invention there is no need for a separate catching device or diaphragm and a separate piezoelectric element as taught and disclosed by Takeuchi et al. It appears that applicant is arguing that Takeuschi et al. fails to disclose an integral diaphragm and piezoelectric element (i.e., a membrane layer comprising a piezoelectric element) in which case applicant's argument is more specific than the invention claimed.

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR

1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Chapman whose telephone number is (703) 305-4920.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

JOHN E. CHAPMAN
PRIMARY EXAMINER